

**Why so Many Qualified Candidates Are Failing the Promotional Written
Examination within the Birmingham Fire Department?**

Strategic Management of Change

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ABSTRACT

This research project recognized a need for change in the promotional process within the Birmingham Fire Department. The problem is to identify why so many qualified candidates are failing the promotional written examination, within the Birmingham Fire Department?

The Birmingham Fire Department has had a dramatic reduction in the number of qualified candidates passing the written portion of the promotional process, since 1990. The purpose is to define the causes of the increasing failure rate on the written promotional examination by qualified candidates for the positions of lieutenant and captain.

The research questions to be answered were:

1. What are the controlling factors governing the promotional process?
2. What research data is available that validates the promotional testing process used by the Birmingham Fire Department?
3. What characteristics among the candidates may affect their ability to pass the written exam?
4. What organizational changes will be required to enact necessary change?

The research methodology used throughout this project was evaluative research methodology. A literature review was performed along with two interviews and two surveys to identify potential causes and solutions for this project.

The results of the research indicated that the establishment of a promotional process is a living entity. The process must be reviewed and enhanced before each

administration, even if the process has been pre-established through a collective bargaining agreement.

A common belief is that promotional candidates are ill prepared for the testing process. Literature review results indicated that a candidate's ability to compete for promotion is directly correlated with their level of formal education and strong knowledge, understanding, and exposure to work behaviors associated with the position being tested for. In contradiction to these beliefs, the survey results indicated that the Birmingham Fire Department's employees appeared to be formally educated, but they saw no advantage to formal education or the other means to success discovered in the literature review. This was reaffirmed by the failure rate on the exams.

Evaluating the results of all the research indicated that the three steps to administering a valid written exam were not followed; job analysis, test development, and test administration. No job analysis, the foundation to the testing process, was developed, which doomed the next two steps to failure.

The research recommended that the promotional process must be reviewed for validity prior to each administration. In addition, a job analysis must be developed for every position within the organization. If the organization is using an outside vendor to develop the test, its direct correlation to the job analysis must be verifiable.

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INTRODUCTION

This research project recognized a need for change in the promotional process within the Birmingham Fire Department. The problem statement is to identify why so many qualified candidates are failing the promotional written examination, within the Birmingham Fire Department?

The Birmingham Fire Department has had a dramatic reduction in the number of qualified candidates passing the written portion of the promotional process, since 1990. The purpose statement is to define the causes of the increasing failure rate on the written promotional examination by qualified candidates for the positions of lieutenant and captain, within the Birmingham Fire Department.

A test that does not have consistent results, or has great variations in scores for equally qualified people taking the same test, may be an indicator of unreliability.

The larger this sampling error, either positive or negative, the less reliable the test is said to be. An unreliable test is an invalid test (Reed, 1995, pp. 23-24).

The most important asset the Birmingham Fire Department has is its' personnel. The quality of the personnel leading and directing these employees has a direct bearing on employee safety and survival. This makes the selection of the best possible candidate in the promotional process essential to the organization.

The research questions to be answered are:

1. What are the controlling factors governing the promotional process?
2. What research data is available that validates the promotional testing process used by the Birmingham Fire Department?

3. What characteristics among the candidates may affect their ability to pass the written exam?
4. What organizational changes will be required to enact necessary change?

The research methodology used throughout this project was evaluative research methodology. A literature review was used to address what historical data and information on the testing process. The current Birmingham Fire Department promotional policies and procedures will be reviewed, as were all other related documents.

Two surveys were used to identify candidate personal characteristics and beliefs, as they apply to the candidate in the promotional process.

BACKGROUND AND SIGNIFICANCE

The City of Birmingham is located in the southeast corner of the State of Michigan. It is approximately six miles northwest of the City of Detroit. The city is an upper-class residential community with a traditional downtown district and a light industrial district.

The Birmingham Fire Department has 40 members and two stations. The staff positions consist of a fire chief and two assistant fire chiefs, prevention and operations. One secretary supports the staff positions. The line positions consist of three captains, six lieutenants, three shift inspectors, one shift emergency medical service coordinator, and 25 firefighter/paramedics.

Each of the two stations is staffed with a minimum of one officer. Adams Station is the Birmingham Fire Department's headquarters. This station's full staffing would be one captain, one lieutenant, one inspector, and six firefighter/paramedics. The second

station is referred to as the Chesterfield Station. This station is always staffed with one lieutenant and two firefighter/paramedics.

The Birmingham Fire Department provides fire suppression, fire prevention, fire public education, advance life support emergency medical services, and hazardous material response. In 2000, the Birmingham Fire Department responded to 1836 alarms. Approximately 58% were medical responses and 42% fire responses (Birmingham Fire Department, 2001).

The Birmingham Fire Department is not mandated to maintain an active eligibility lists for promotion. The only time a promotional eligibility list is compiled is when an opening exists. There are currently three testable positions emergency medical services coordinator, lieutenant, and captain. The position of emergency medical service coordinator just became a testable position in 1998. The positions of paramedic and inspector are considered assignments and not promotions, under the current labor agreement. Upon completion of the promotion process, an active eligibility list is maintained for twelve months (City of Birmingham, 1998).

The promotional process includes three steps, written exam, oral board, and points awarded for seniority and annual personnel evaluation. The first step in the Birmingham Fire Department's promotional testing is the written exam. Since 1990, no more than two candidates have passed a promotional written exam each time it has been given. In the period between 1996 and 1999, only one of no less than thirteen candidates passed the lieutenants written exam each time it was given (D. Edginton, memorandum, May 18, 1996; Feb. 23, 1998; Sept. 29, 1999). In 1998, one of six candidates passed the captains written test (D. Edginton, memorandum, Sept. 29,

1999). In each case, since no other eligible candidates had successfully completed the first step in the promotion process, the rest of the process was dismissed and the individual was promoted (D. Edginton, memorandum, Feb. 23, 1998; Sept. 29, 1999).

Prior to 1990, the pass/fail ratio was much higher than currently exists. During a period in which seven promotional examinations were conducted, between 1970 and 1990, over half of all the candidates that participated in each process passed the written examination (D. Edginton, personal communication, March 8, 2001).

The Birmingham Fire Department appears to be at a crossroad. Currently all three staff personnel, a captain, and a lieutenant are all eligible to retire. All of these employees appear to be waiting for the current labor contract to expire, so they can retire with the same increased pension benefits that the other labor organizations have recently received. The labor agreement between the fire department union and the City will expire on June 30, 2002. By that time, an additional captain and lieutenant will be eligible to retire.

The staff positions are non-union, so they are not part of the labor agreement and are promoted by appointment. These positions have traditionally come from the officer ranks within the organization. The Birmingham Fire Department has the potential of having to promote seven employees in less than a six-month period of time.

The research for this project was based on the principles and methods learned in the National Fire Academy program, Strategic Management of Change. Specifically, the Change Management Model, which was the foundation of the program. This research will mirror phase I of the model, Analysis. This project will analyze the

problem, in an attempt to clearly define the change needed in the promotional process first step, the written examination.

The researcher for this project is an administrator for the Oakland Fire Training Institute (OFTI). Consulting and assisting area fire administrators in understanding and coordinating change is a major function of the administrative staff at OFTI. While serving in that capacity, the researcher is also a member of the Birmingham Fire Department. This researcher has a vested interest in the advancement of the Birmingham Fire Department.

LITERATURE REVIEW

The purpose of this review was to provide information from which a solution to the problem could be found.

The Conditions Governing the Promotional Process in the Birmingham Fire Department.

The current promotional process used in the Birmingham Fire Department was established as a part of the collective bargaining agreement, in 1960. Prior to that date, all promotions were done by appointment. These appointments were solely at the discretion of the chief and did not require qualifying criteria or justification (D. Edginton, personal communication, March 8, 2001).

The current promotional process requires that an employee must have successfully passed probation, in the current position they hold in the organization, and have achieved top pay in their current job classification. The position of emergency medical service coordinator has an additional requirement of a valid paramedic license.

An additional requirement, for the position of captain, is a candidate has to have achieved a Fire Certificate.

The Fire Certificate is achieved through the local community colleges. To receive the certificate, a student must have successfully completed all of the core classes in the academic field of study of Fire Science or Fire Technology.

The promotional process is the same for all testable position within the fire department. The process is designed to build upon itself. Each candidate is required to pass the preceding step before advancing to the next one. The first step in the process is the written exam. This step is worth 40 percent of a candidate's total score. To successfully complete this step the candidate must have a standard score of 70 percent on the written examination (City of Birmingham, 1998, pp. 12-13).

The use of standard scoring was mandated through a legal action, in 1984 (State of Michigan Department of Labor Employment Relations Commission, 1984). This legal action was in the form a grievance arbitration award. The City of Birmingham changed the scoring system used on the written examination to the T-curve, or the percentile of the results. Using the T-curve, a passing score was at the 70 percentile mark of all the participants that have taken that test, state wide, within the last twelve months. The change in scoring was recommended by the Michigan Municipal League, the provider of the written exam. The Michigan Municipal Leagues use of percentile scoring is part of the validation process of this examination (D. Summerfield, personal communication, March 8, 2001).

The grievance alleged that the City illegally changed the scoring practices of the written test, in an attempt promote whom they wanted. The Union argued that past

practice has been to use the standard scoring scale and that any change in the score system would be a negotiable item. The arbitrator agreed with the Union stating, "Any change in score process could only occur at the bargaining table" (State of Michigan Department of Labor Employment Relations Commission, 1984, p. 6).

The second phase of the promotional process is the oral board. This step is worth 40 percent of the total score. Chief officers from outside of the organization are gathered to evaluate each candidate's response from a list of provided questions. The City's Human Resources Department monitors the oral board. There is no minimum score to successfully complete this phase of testing (City of Birmingham, 1998, p. 12).

The last phase, is the awarding of seniority and evaluation points. Seniority points are awarded on the basis of years employed. One-half of one point is awarded for every year of service, up to ten points or twenty years of service. Evaluation points are an average of the last three annual personal evaluations, and then multiplied by two. The personal evaluation scale is one to five. The total possible score for evaluation is ten points (City of Birmingham, 1998, p. 13).

All the points are tabulated and rounded up to the near one thousands of a point. The candidate with the highest score is awarded the promotion and the remaining candidates are placed on an eligibility list for twelve months (City of Birmingham, 1998, p. 13).

Valid and Related Research Data that Supports this form of Written Testing?

"A test is a means by which the absence, presence, amount, or nature of some learner quality or ability is observed or inferred and appraised or measured" (Bizjak, 1999, p. 189). The test must be based on the list of established learned objects. A test

is not valued, nor can it measure the knowledge base of an individual if it is not objective based testing (Bizjak, 1999).

Jerry Solamon (1997) writes that there are three steps that must be followed when administering a written testing; job analysis, test development, and test administration (p. 82). Written tests must be developed to measure the duties, abilities, skills and knowledge necessary or desirable for successful job performance and this cannot be done without a comprehensive job analysis, first (Norris, p. 39).

The Equal Employment Opportunity Commission (EEOC) defines job analysis, “A detailed statement of work behaviors and other information relevant to the job” (Uniform Guidelines on Employee Selection Procedures, 1978).

The EEOC defines work behavior as, “An activity performed to achieve the objectives of the job” (Uniform Guidelines on Employee Selection Procedures, 1978, 1607-16). The EEOC explains work behaviors as “involve observable (physical) components and unobservable (mental) components. A work behavior consists of the performance of one or more tasks. Knowledge, skills, and abilities are not behaviors, although they may be applied in work behaviors” (Uniform Guidelines on Employee Selection Procedures, 1978, 1607-16).

The EEOC describes the process of a job analysis as follows:

(2) Analysis of the job. There should be a review of job information to determine measures of work behavior(s) or performance that are relevant to the job or group of jobs in question. These measures or criteria are relevant to the extent that they represent critical or important job duties, work behaviors or work outcomes as developed from the review of job information. The possibility of bias

should be considered both in selection of the criterion measures and their application. In view of the possibility of bias in subjective evaluations, supervisory rating techniques and instructions to ratters should be carefully developed. All criterion measures and the methods for gathering data need to be examined for freedom from factors that would unfairly alter scores of members of any group. The relevance of criteria and their freedom from bias are of particular concern when there are significant differences in measures of job performance for different groups (Uniform Guidelines on Employee Selection Procedures, 1978, 1607-14).

The process of performing a job analysis would begin with interviewing staff officers, direct supervisors over that position, and officers of the same rank for which the test is given. Based on these interviews, a questionnaire would be developed and distributed to all that are currently in the rank for which the analysis is being prepared. The questionnaire would list knowledge items, skills, and abilities relevant to the tasks and duties of the rank. Participants would rate the relevance of each of the items listed on the questionnaire (Murtagh, 1994).

The final step in a job analysis is to circulate the task analysis to all incumbents in the fire department. They are asked to rank-order each task and knowledge statement according to how important it is and how often it is performed (Clark, 1990).

“It cannot be overemphasized the importance of doing a job analysis prior to testing. The job analysis provides the foundation for the validation process” (Reed, 1995, p. 25).

The Birmingham Fire Department does not have a detailed statement of work behavior. What they have is a general job description for each classification, Emergency Medical Service Coordinator, Lieutenant, and Captain within the organization. The EEOC defines a general statement of job duties and responsibilities, as a job description (Uniform Guidelines on Employee Selection Procedures, 1978, 1607-16).

The written test used for promotion in the Birmingham Fire Department is an achievement test. "The purpose of the achievement test is to determine whether a candidate's knowledge is sufficient to perform the job for which he or she is applying" (Norris, 1990, p.39). Specific knowledge of a subject matter may be required for specific jobs and it is widely believed that the most effective way to evaluate a candidate's knowledge is through written achievement tests (Nigro, 1991, p.289).

Usually, it is better to purchase a test from a company, because the content has been validated. Commercially produced written tests have been used a number of times and this allows for the result to be predictable (Cowardin, 1997).

The written exam used by the Birmingham Fire Department is the property of the Michigan Municipal League. The Michigan Municipal League has been the sole provider of promotional exam, for all departments, for the City of Birmingham since 1970. The tests are predominately multiple choice questions requiring reasoning skills and some problem solving abilities (Don Summerfield, personal communication, March 8, 2001).

There has been occasionally a section of true and false questions. The correct answer will award one point. If the question is left blank, one point will be taken away

from the total score. When the question is answer incorrectly, two points are removed from the total score. The answers are place on a scan form, with the candidate's name and test number (Don Summerfield, personal communication, March 8, 2001).

The written examination is approximately 170 questions in length and is given three hours to complete. Gloria Bizjak (1999) in her book, *Fire and Emergency Services Instructor*, suggests ..."an adult can average one multiple choice, or three true and false items in one minute," when being tested (p. 198).

The written tests for each position are similar, but do require increased knowledge in all of the areas of study. Each written test follows the same format. Each test has as few as five sections, but as many as nine. Each individual section represents an area of study and each area of study has at least three levels of difficulty. Available areas of study for the lieutenant's exam are fire technical knowledge, supervision, apparatus, pumps, vehicle maintenance, fire inspections, fire prevention, arson investigation, first aid, public relation, instructional techniques, administration, and management theory. Available area of study for the captain exam includes all those in the lieutenant's exam, but in addition it includes budgeting, finance, leadership, human resources, and planning (D. Summerfield, personal communication, March 8, 2001; Michigan Municipal League, 1999).

The reference material used in developing all the promotional exam questions for the Michigan Municipal League examinations are two-tiered (Appendix A). The first tier is considered the primary reference material. This material is used as the primary source for test questions. The second reference material is designed to supplement the remainder of the test or used in specific classification that require more technical

knowledge in a highly technical subject, such as pump operator or engineer (Michigan Municipal League, 1999).

Content validity is utilized in the validation of the written exam by the Michigan Municipal League. According to Robert. W. Keith (1974), content validity establishes the degree to which questions are a representative of the tasks required to perform the job. Content Validity is used more in the public sectors than other type of validation technique (p.82).

Stephen Wollack (1976) describes the use of content validity.

Content validity is applicable when a test purports to measure existing job skills, knowledge, or behaviors. The purpose of content validation is to show that the test measures the job or adequately reflects the skills or knowledge required to do the job (p. 403).

Dennis Dresang (1991) states that content validity is described as a logical model for validation.

Content validity requires a position analysis and an examination that consciously tries to test the knowledge, skills, and abilities identified as necessary by the position analysis. Content validation also requires a scoring system that weighs the various characteristics being tested in accordance with the weight established in the position analysis (p. 175).

“The closer the test resembles the content or required knowledge and skills of the job, the more justified is the claim of content validity” (Wollack, 1976, p.404).

Validation of the test process has been upheld in court. In a case specifically related to a fire service promotional process, Timothy Callahan (1987) discussed

Firefighters Institute for Racial Equality v. City of St. Louis. This case reaffirmed the court's and the EEOC's position that tests must measure only those knowledge, skills, and abilities necessary to perform the job. In this case, applicants were testing for the position of captain. "Where the qualifications for successful performance of a fire captain's position were assessing the scene of a fire and issuing the appropriate oral orders. Paper and pencil examinations that essentially tested for written communication skills were held invalid" (p.55).

The federal *Uniform Guidelines on Employee Selection Procedures* (1978) limits the adverse impact an employer can impose. "Employer policies and practices that have an unfavorable impact on any race, gender, or ethnic group are illegal unless justified by business necessity" (Johnson, 1995, p.250). To prove a business necessity there must be a clear relationship between what is evaluated by the selection procedure and the performance required by the position being tested for (Johnson, 1995).

Are there characteristics among the candidates that would affect their ability to pass the written exam?

Legislation that affects the testing process is the Rehabilitation Act of 1973. This law prevents the use of tests to discriminate or adversely impact individuals with handicaps.

The Americans with Disabilities Act compliments the Rehabilitation Act of 1973 by prohibiting discrimination against any person having mental or physical disabilities in all employment settings. Employers must make reasonable accommodations for any known physical or mental limitation, unless the employer can prove undue hardship as it relates to the safety and health of the disabled or other employees (Schneid, 1991).

The affects on the candidate must be considered in the promotional process. Beyond those stated by the EEOC and current legislation, others must be considered. One of the strongest criticisms of the multiple-choice format of the written test is that it favors younger employees. The younger employee has been given an advantage over the older employee because of the physical time removed from formal education. The younger employee has seen and is more familiar with this style of testing (Norris, 1990).

A common belief is that promotional candidates are ill prepared for the testing process. Walter S. Booth (1999) believes that most promotional candidates are "...simply thrown into the deep end of the promotional pool, with the vague hope that more will swim than sink" (p. 78). Booth surveyed 408 paid fire departments, with staffing of over 100 personnel, on the promotional processes they use. With 166 responses, Booth concluded that most fire departments had required specific training programs, such as state fire officer certifications, prior to participating in the promotional process for lieutenant rank. These same fire departments commonly do not have any prior training for participation in the promotional process for captain. The survey did indicate that 32 percent of the surveyed departments required some college as a prerequisite for lieutenant candidates and 34 percent for captain candidates (p. 80).

The candidate's ability to compete for promotion has a direct correlation with the level of formal education they have achieved. "Candidates who meet the minimum educational levels are minimally eligible to test, although more competitive candidates often hold more advanced degrees" (Booth, 1999, p. 80).

Booth (1999) also indicated, from the results of his survey, that all respondent departments had a "... time in grade required before a person is eligible to test" (p. 82).

Some common testing barriers are when a test is written with too high of a reading comprehension level, the test is too lengthy or complex, or the questions are written in unclear sentences. Any one or a combinations of these would cause difficulties to a candidate (Bizjak, 1999).

The use of multiple choice questions is common on written promotional examinations. The concerning issue is the design and construction of the multiple-choice test. "Multiple choice tests are not easy to construct. They must be unambiguous and test to the learning level desired" (Bizak, 1999, p. 203). There is a tendency to be ambiguous when designing questions, so not to make the answer obvious (Bizak, 1999).

When the design or construction of a test is ambiguous, the test takers anxiety and frustration will naturally increase. Test anxiety could be affecting the candidates, in the Birmingham Fire Department's promotional process. Test anxiety is included under the major heading of "Anxiety Disorders" in the Diagnostic and Statistical manual of the American Psychiatric Association. Everybody experiences some level of test anxiety. The level of anxiety will increase in direct response to the level of importance placed on it by the candidate. Repeated exposure to a testing process can lower test anxiety, while repeated failure of an exam can also cause increased test anxiety. Experiences of test anxiety can completely inhibit a person's career performance. The diagnosis of test anxiety can only performed by a trained psychologist (Roig, 1991).

PROCEDURES

This research project employed an evaluative research methodology. The object of this research project is to define the change needed in the promotional process, as

described in the background section of the research. This was accomplished through the interpretation of the information collected in the literature review, two interviews, two surveys, verification of reference material availability, and the information provided by the Birmingham Fire Department. The information collected was used in an attempt to answer the research questions of this project.

The foundation to the research process was the Change Management Model, Phase I, Analysis. This phase of the model is designed to analyze the organizational change indicated, as it applies to the mission, standards, values, and norms. Phase I also is used to identify potential destabilizing forces, such as unforeseen solutions or problems that come with change. It continues on to directly assess the impact change will have on the organization. The final step, in Phase I of the model, is to determine the organizational change requirements in implementing change. Phase I of the model was used in this project.

Literature Review

The literature review was the foundation of this research project. The literature review defined the promotional testing process, in the Birmingham Fire Department, and how it related to established guideline. Documents received and reviewed from the Birmingham Fire Department were instrumental in understanding the environment and criteria required in their promotional process.

Interview of Fire Chief

After the review of the documents supplied by the Birmingham Fire Department, an interview was done with Fire Chief David Edginton. The interview was designed to

describe the history of the promotional system, and to fill any gaps or questions that arose during the document review.

Interview of Don Summerfield

Once the literature review was completed, a telephone interview was conducted between the researcher and Donald Summerfield, Administrative Director of Personnel Evaluations and Testing, Michigan Municipal League. The interview was designed to solicit information about the promotional written examinations his organization provided for the Birmingham Fire Department. Other areas discussed were the history of the testing process, their validation process, methods of scoring of the test, and selection of reference material.

Surveys

Finally, two surveys were developed in an attempt to measure the affects the test and the process had on the candidates.

The first survey was an employee based survey (Appendix B). The survey attempted to measure the qualification of the promotional candidates and any possible environmental affects the promotional process may have. The survey would measure time in grade, education, number of participation's in the promotional process, and if successful in the being promoted, what played the largest role in assisting the candidates in their promotion. The population of this survey was every line member, excluding the researcher, of the fire department that has met the minimum time in grade requirement for promotion for the position of emergency medical service coordinator, lieutenant or captain in the Birmingham Fire Department. There were 32 of the 34 line members that met this qualification. The survey was distributed and collected during

the week of March 12, 2001. This week was chosen for its ability to allow for every member of the target population to participate.

The second survey was given to all lieutenants, captains, and the emergency medical coordinator in the Birmingham Fire Department (Appendix C). This survey was used to measure whether the promotional written examination these officers passed to be promoted was truly a reflection of the job task and responsibilities of the position they currently hold. This survey asked for personal beliefs of these current officers. The population used in this survey was every current line officer, excluding the researcher. The population total was nine, two captains, six lieutenants, and one emergency medical service coordinator. While some of the current lieutenants and captains may have been promoted before 1990, no staff personnel have participated in the fire departments promotional exam since 1990, so they were excluded from the survey attendance. This survey was distributed and collected during the week of March 19, 2001. This week was chosen for its ability to allow for every member of the target population to participate.

Data was collected and compiled as it was returned. The results of both surveys were condensed and calculated. The use of statistics was used where applicable. Conclusions were made from these results.

Research Reference List used in Promotional Process

After analyzing the results from the surveys, they indicated that the reference material used in the promotional process (Appendix A) was not available. Two Michigan retailers of fire service literature and two national bookstore chains were contacted, by phone, to determine the availability of the reference list. The International

Fire Service Training Association was contacted, by phone, to determine availability of their specific reference materials listed.

Assumptions and Limitations

The research was designed under the assumption that a change was indicted in the promotional written examination process, within the Birmingham Fire Department.

Limitation noted in the literature review was that the study of written promotional examinations has not had recent detailed studies performed. Limitation noted in the both surveys was the small populations used, as well as the use of personnel opinions. Both surveys were designed by the researcher and are limited to the researcher's knowledge of survey development and interpretation.

The research of the reference material list was limited to five retailers. No research was done to determine the availability of the reference list from local libraries. Justification for use of this assumption was that fire service literature is available, in limited quantities, from college libraries, but could not guarantee every candidate availability to all reference materials.

Definitions of Terms

Fire Certificate – Is a certificate of completions of a specific area of study in fire science or fire technology. A 2.0 grade point average must have been achieved in each of the core courses.

Labor Agreement - A collective bargaining agree between the City and the Union of fire department employees.

Line - Members of the fire department that are assigned to shift duties or a 24 hour duty shift.

Percentile – One of a set of points on a scale arrived at by dividing a group into parts in order of magnitude. For example, a score higher than 70 percent of those attained on an examination is said to be in the 70th percentile. A statistical term used to measure performance standard.

Staff - Members of the fire department that are assigned administrative duties.

Standard Score – The total number of questions is divided into the correct responses and a percentage is determined.

T-curve - A grading curve used by the Michigan Municipal League in measuring candidate test results in percentiles.

Time in Grade - An employee's seniority in their current position within a fire department, measured in years.

RESULTS

The literature review clearly described the conditions governing the promotional process in the Birmingham Fire Department. The process is established in 1960, through a collective bargaining agreement. The process has been essentially unchanged since that time.

The Birmingham Fire Department promotional process is three fold. The first step is the written examination, followed by an oral board and awarding of seniority and evaluation points. William S. Johnson (1995) writes in the Personnel Administration chapter of the *Fire Chief's Handbook*:

The examination process is negotiable. Union and management must agree on the person who will conduct the written exam ... Seventy percent is a passing grade and accounts for fifty percent of the total score. Only those candidates

who pass the written portion of the exam are eligible to move on to the oral phase (p.252).

The example promotional process that Johnson describes is very similar to that used in the Birmingham Fire Department. The weight given to the exam in Birmingham is forty percent, rather than fifty.

The use of a written examination is very common throughout the United States. Walter S. Booth (1999) found that the use of a written examination, for the position of lieutenant and captain, occurs in 85 percent and 89 percent of the agencies surveyed (p. 80).

The promotional process, in the Birmingham Fire Department, has eligibility requirements to be considered a qualified candidate for promotion. For the position of lieutenant, any firefighter is eligible to precipitate in the promotional process if they have achieved top pay. Under the current labor agreement, it takes 48 months to reach top pay in the job classification of firefighter (City of Birmingham, 1998, p. 12).

The use of time in grade eligibility for promotion is consistent throughout the survey performed by Booth (1999). Booth found that every fire department that responded to his survey had a time in grade requirement in the promotional process. The modal time in grade for the position of lieutenant was five years. This was for the fire departments that did not have an engineer position. For those with engineer classification, it still required three year time in grade for eligibility for that position and an additional two years as an engineer to be eligible for lieutenant. The average time in grade, of all respondents was 5.6 years (p. 80).

The requirement of time in grade is universal within the fire service. Birmingham requires that a candidate achieve top pay in their current classification to be eligible for promotion (City of Birmingham, 1998, p. 12). William M. Kramer writes in the Training and Education chapter of the *Fire Chief's Handbook* (1995), ...“it is universally agreed that the school of hard knocks is one of the best teachers” (p. 331).

Birmingham Fire Department has the same time in grade requirement for the position of captain. The captain classification required one year to achieve top pay and to be eligible for promotion. Booth's survey discovered that the modal time in grade for the captain position was two years (Booth, 1999, p. 80).

The additional eligibility requirement the Birmingham Fire Department has for the classification of captain is an educational prerequisite. There is the requirement of a Fire Certificate to be considered eligible for promotion (City of Birmingham, 1998, p. 13). A Fire Certificate is equivalent to one year of college and is approximately 33 credit hours of course work. William M. Kramer stated that a college certificate is recommended for company officers (Kramer, 1995, p. 332, Fig. 10-3) and states, “As firefighters aspire to higher positions, and seek promotions, the need for education becomes increasingly important” (p. 333). Birmingham's requirement of a fire certificate to be eligible candidate for captain follows Kramer's recommendations.

Stephen N. Foley (1995) writes in the Occupational Safety and Health chapter of the *Fire Chief's Handbook*, “Today we stress the need for training before promotion” (p. 288). Foley believes that there is strong evidence to support prior training of first line fire supervisors in human resource management. “Supervisory position require many

skills, none of which is more important than dealing with human resources management” (p.288).

The nation wide survey of fire departments found that 35 percent of the respondents’ requirements had to have some college, 21 percent required an Associate Degree, and two percent required a Bachelor Degree to be qualified candidate for promotion. The survey also indicated that 19 percent of the respondents stated they award bonus points in their promotional process for formal education, beyond the minimum required for that position (Booth 1999, p. 80).

The written test used for promotion in the Birmingham Fire Department is an achievement test. “The purpose of the achievement test is to determine whether a candidate’s knowledge is sufficient to perform the job for which he or she is applying” (Norris, 1990, p.39). The literature review indicated that specific knowledge of a subject matter may be required for specific jobs and that the most effective way to evaluate a candidate’s knowledge is through written achievement tests.

The time allotted for administration of the exam is three hours, or 180 minutes. The accepted standard for administering a written examination, based on multiple choice format, is one question a minute (Bizjak, 1999). The written examination produce by the Michigan Municipal League is limited to 180 questions (Donald Summerfield, personal communication, March 8, 2001).

The Michigan Municipal League provides the written examination. They have been the same provider of written promotional examination for over 30 years. The use of a commercial or outside vendor to provide the written exam is desirable, because the content has been validated (Cowardin, 1997).

The grading system recommended for the written examination is based on a percentile curve. This curve is called a t-score. The t-scoring system takes into consideration all test candidates, state wide, over the last twelve month. According to the Michigan Municipal League, this scoring system is used in the validation process for the examination (Donald Summerfield, personal communication, March 8, 2001).

The use of the t-score was disallowed through a grievance settlement in 1984. The use of standard scoring is used to grade the promotional examinations, in the Birmingham Fire Department. Comparing the 166 questions in the 1999 lieutenant's written promotional examination, a standard score of 117 correct question was needed to pass the examination. According to Donald Summerfield (2001), the t-score for that exam would be equivalent to a standard score of 97 correct questions. A standard score of 117 correct questions would be equivalent to 99.1 t-score (personal communication, March 8, 2001).

William S. Johnson (1995) also describes the development of the written examination, "Once the need arises for a promotional examination, a copy of the job description is sent to the examiner and a bibliography is promulgated" (Fire Chiefs, p. 252). Throughout his chapter, Johnson refers to a job description as a measure of the work behaviors and activities performed. This step in the test development was found to differ to the current method used by the Birmingham Fire Department.

The written examination policies of the Michigan Municipal League mandates that the agency that they contract with, such as the Birmingham Fire Department, has to select each section of the exam. This is done as part of the validation process. The responsibility to have the written tests directly correlate to duties and responsibilities of

position being test is the agency's and not the Michigan Municipal Leagues (Donald Summerfield, personal communication, March 8, 1999).

The direct correlation of the examination with the duties to be performed was reaffirmed in the court case, *Firefighters Institute for Racial Equality v. City of St. Louis*. The court stated that the use of a "paper and pencil examination that essentially tested for written communication skills were held invalid," when the job required assessing the scene of a fire and issuing orders (Callahan, 1987, p. 55).

To directly tie a test to the future job duties and responsibilities is known as validity. The process of administering a valid written test has three steps; job analysis, test development, and test administration (Solamon, 1997, p. 82). The Michigan Municipal League will assist in the defining the final two steps in this process and requires the job analysis to be done by the agency they contract with. The Birmingham Fire Department has developed a general job description and uses this document in the validation process.

A review of the literature has shown that there is more than one form that constitutes and defines validation, especially as it relates to testing. "However, a universal theme in these definitions is that a valid test shows a logical relationship between the test itself and what it purports to measure" (Reed, 1995, p. 19).

The EEOC requires that all testing must be directly correlated to the duties and responsibilities of that job classification being tested for. The use of a job analysis, "A detailed statement of work behaviors and other information relevant to the job," is required in the validation of the test. (Uniform Guidelines on Employee Selection Procedures, 1978, 1607-16).

“It cannot be overemphasized the importance of doing a job analysis prior to testing. The job analysis provides the foundation for the validation process” (Reed, 1995, p. 25).

The review of the documents provided by the Birmingham Fire Department could not find a detailed statement of work behaviors. The Birmingham Fire Department has a general job description that is all inclusive to the responsibilities and authority given to each position of lieutenant and captain.

The written test is an achievement test format. It uses multiple choice and a few true and false questions. The questions are designed from information obtained from a reference list of publications (Appendix A). The content validity, used by the Michigan Municipal League, establishes the degree to which questions are representative of the tasks required to perform the job. Each section of the Michigan Municipal League’s written promotional exams have a set of specific tasks that are commonly assigned to each job classification. The higher the job classification, the more detailed knowledge and precise decision making skills are measured (Donald Summerfield, personal communication, March 8, 2001).

Survey: Questionnaire

The first survey was designed to measure the three aspects in testing. First, the personnel traits that affected the candidate when testing. The next was the written test’s ability to truly measure what it was designed to measure. The final measurement was whether the knowledge or lack of knowledge gained on the job, or while being mentored, or gained through formal education assisted them.

The first five questions were requesting demographic information (Appendix B). The first question asked the seniority of the respondent and their response ranged from six to thirty-one years.

The second question measured the number of written examinations each respondent had participated in. Their responses ranged from one to seven written exams. The largest response group was three tests with eight responses. The next frequent response was two tests with seven, followed by four tests with six, one test with four, five tests with two, and seven tests with one. A total of 83 examinations experienced by the respondents.

The next question asked if the respondent had successfully passed a written examination. If the respondent's answer was yes, which attempt was it when they passed the test. Of the 26 respondents, 19 had passed a written exam. Fifteen respondents passed the test on their first attempt. In addition to whether they passed an examination, they were asked the year they passed. All fifteen respondents that answer they passed the exam on their first attempt, did so prior to 1990. Three respondents stated that they passed the written examination for the first time after 1990. Two of the respondents passed the exam on their third attempt, with one respondent stating they passed their first written exam in 1999 after taking the exam four times.

The fourth question asked how many promotional written examination's they had taken, since 1990 and what the results were. Twenty-four of the respondents have participated in a written examination, with a total of forty-six examinations taken, since 1990. Eight of the respondents have passed a written examination since 1990.

The final demographic question referenced each respondent's formal educational status. The results were one respondent had completed four years of college, one had three years of college, ten had two years of college, five had some college, and nine had completed high school.

The next phase asked the candidates to respond to a series of statements. They were asked to weight their response. The responses ranged from a one to five scale. A response of one equaled strongly disagrees with the statement asked, while five equaled strongly agree with the statement. The results for each statement are listed in table 1 (see pages 33-35).

The statements asked on the questionnaire were broken into three categories. The three categories were personal, the test, and training and education. All three areas statements were scattered throughout the questionnaire and only grouped to measure the results.

The first category is personal. These statements were designed to measure the personal affects of the testing process on a candidate. The results in this area indicated most of the respondents had some form of test anxiety.

When asked to respond to the statement, I do not like tests, most agreed with this statement. The mode response was four, with a standard deviation of 1.002. There were only six respondents disagreeing with this statement.

The candidates also indicated that prior exposure to the testing process was very helpful. The mode response was four, agree. The total population did not respond to this statement. This statement had 20 respondents, with twelve agreeing with the statement.

Table 1: Questionnaire Responses to PART II

	strongly disagree				strongly agree
<u>Personal</u>					
	() = number of responses				
I do not like tests	1	2	3	4	5
	(1)	(5)	(8)	(10)	(2)
	Mean = 3.269	Mode = 4		SD = 1.002	
I performed better on multiple-choice questions.	1	2	3	4	5
	(2)	(2)	(12)	(8)	(2)
	Mean = 3.231	Mode = 3		SD = 0.992	
I performed better on true and false questions	1	2	3	4	5
	(0)	(2)	(14)	(6)	(4)
	Mean = 3.462	Mode = 3		SD = 0.859	
I found the multiple choice question hard	1	2	3	4	5
	(1)	(6)	(14)	(5)	(0)
	Mean = 2.885	Mode = 3		SD = 0.766	
I found the true and false question difficult	1	2	3	4	5
	(1)	(2)	(12)	(8)	(3)
	Mean = 3.385	Mode = 3		SD = 0.941	
Distraction while taking the test had an effect on my score	1	2	3	4	5
	(3)	(4)	(12)	(5)	(2)
	Mean = 2.962	Mode = 3		SD = 1.076	
I made numerous errors on the score sheet	1	2	3	4	5
	(16)	(5)	(3)	(0)	(2)
	Mean = 1.731	Mode = 1		SD = 1.185	
Having taken the exam and seeing the questions before was very helpful	1	2	3	4	5
	(6)	(0)	(2)	(10)	(2)
	Mean = 3.100	Mode = 4		SD = 1.483	
<u>The Test</u>					
The questions were clear and concise	1	2	3	4	5
	(3)	(15)	(4)	(4)	(0)
	Mean = 2.346	Mode = 2		SD = 0.892	
The questions were confusing and ambiguous	1	2	3	4	5
	(1)	(3)	(8)	(12)	(1)
	Mean = 3.269	Mode = 4		SD = 1.002	
The score sheet was easy to follow and use	1	2	3	4	5
	(1)	(1)	(12)	(3)	(9)
	Mean = 1.123	Mode = 3		SD = 1.123	
The test came primarily from the five main books listed as primary reference	1	2	3	4	5
	(12)	(8)	(4)	(1)	(1)
	Mean = 1.885	Mode = 1		SD = 1.071	
SD = Standard Deviation					

Table 1: Questionnaire Responses to PART II (continued)

	strongly disagree					strongly agree					
	() = number of responses										
The reference material directly pertained to the job I was testing for	1	2	3	4	5						
	(6)	(14)	(5)	(1)	(0)						
	Mean = 2.038					Mode = 2					SD = 0.774
The reference material was easy to find	1	2	3	4	5						
	(14)	(12)	(0)	(0)	(0)						
	Mean = 1.462					Mode = 1					SD = 0.508
The test was evenly balanced from all reference materials	1	2	3	4	5						
	(8)	(10)	(6)	(2)	(0)						
	Mean = 2.077					Mode = 2					SD = 0.935
The reference material was quickly understood and retained	1	2	3	4	5						
	(6)	(6)	(10)	(4)	(0)						
	Mean = 2.462					Mode = 3					SD = 1.029
The reference material was out dated	1	2	3	4	5						
	(1)	(1)	(6)	(2)	(16)						
	Mean = 4.192					Mode = 5					SD = 1.167
The test questions directly related to the reference materials	1	2	3	4	5						
	(13)	(10)	(0)	(3)	(0)						
	Mean = 1.731					Mode = 1					SD = 0.962
The test had little relationship to the real duties of the job I was testing for	1	2	3	4	5						
	(0)	(4)	(2)	(8)	(12)						
	Mean = 4.077					Mode = 5					SD = 1.093
Knowledge of the job description and duties had no effect on my score	1	2	3	4	5						
	(0)	(4)	(4)	(10)	(8)						
	Mean = 3.846					Mode = 4					SD = 1.047
<u>Training and Education</u>											
Receiving help and study material from others raised my score	1	2	3	4	5						
	(0)	(4)	(4)	(8)	(10)						
	Mean = 3.923					Mode = 5					SD = 1.093
My experience in my current position helped me on the test	1	2	3	4	5						
	(8)	(8)	(6)	(3)	(1)						
	Mean = 2.269					Mode = 1,2					SD = 1.151
Prior in-service training helped me	1	2	3	4	5						
	(10)	(8)	(6)	(1)	(1)						
	Mean = 2.038					Mode = 1					SD = 1.076

SD = Standard Deviation

Table 1: Questionnaire Responses to PART II (continued)

	strongly disagree				strongly agree
	() = number of responses				
Prior out-side officer training did nothing to help me	1 (5)	2 (0)	3 (5)	4 (12)	5 (4)
	Mean = 3.385		Mode = 4	SD = 1.329	
My college education was of no aid in taking the test	1 (2)	2 (8)	3 (6)	4 (1)	5 (1)
	Mean = 2.500		Mode = 2	SD = 0.985	

SD = Standard Deviation

n=26

The strong support against testing was not reflected in the use of the score sheet or being distracted during the testing process. Only two respondents agreed that they had numerous errors when using a scantron score sheet, with a mode response of one. Being distracted during the testing process was evenly balance responses, with the mode of three.

The final statements, in the personal section of the questionnaire, attempted to measure the beliefs of the candidate, as to the style of test questions. When asked their beliefs, about which style of question they perform better on, multiple choice questions or true and false, the respondents were not clear. Both statements had a mode response of three, mean scores of over three, and standard deviations of less than one. Both statements had more agreed responses than disagreed.

When asked if they found both styles of questions hard, again the response mode was three, but the response to the difficulty of multiple choice questions had a mean of 2.885. This indicates that more respondents did not find that style of question difficult. This was not true in their response to the difficulty of true and false questions.

The mean was 3.385, which indicates that they do find the true and false questions difficult.

The second section of the survey was designed to measure the test. The total measurement of this section indicated that the test was not designed as presented to the candidates. The candidates strongly indicated that the questions were not clear and concise, and the questions were confusing and ambiguous in design.

The candidates did strongly indicated that the use of a scantron score sheet was easy to follow, with a mean of 3.692 . There was only two respondent indicating difficulties using the score sheet.

The candidates indicated that the test was not evenly balanced from all reference materials. The mode to this statement was two, with a mean of 2.077. How the test reflected the reference material was the rest of this section's statements. When asked if the test came primarily from the five main references listed on the Fire Service Officer Examination Study Guide (Appendix A), the respondents did not agree with that statement. The mode to this statement was one, with only two respondents agreeing to this statement.

The respondents also indicated that the reference material was outdated and difficult to find. Additionally, they indicated that the reference materials were not easy to understand and retain.

The respondents did disagree with the statement pertaining to the direct relationship to the test and the reference material. The candidates strongly disagreed with this relationship. This statement had a mode of one and a mean of 1.731.

The candidates also disagreed with a direct relation to the reference material and the job they were testing for. The mode for this question was two, with a mean of 2.038.

The candidates indicated that the test did not have a relationship with the job description of the classification they were testing for. The mode response was five for this statement. When asked the same statement, but requiring an opposite response, the results were the same. The candidates agreed that having prior knowledge of the duties of the classification had no effect on their score. The mode for this question was four, with a mean 3.846.

The last section or part II of the survey was used to measure the effect training and education, whether expediential or formal, had on their abilities to pass the test. The respondents strongly agreed that help from others help raise their score. The mode response was five.

The candidates disagreed with the statement that experience in their current positions helped them pass the test, with a mode response of 1 and 2.

The respondents also indicated that participating in in-service training did not assist them in passing the examination. The statement indicating that in-service training helped them prepared for the written exam was strongly disagreed with.

When asked about outside training and formal training received in college, the respondents were supportive. The statement indicating that out-side training was not helpful was disagreed with. Only five respondents agreed with that statement. The same was true when asked about the candidates ability to relate learned information to their performance on the test. The candidate was told that their college experience was no aid in taking the test. The respondents disagreed with that statement, with a mode

response of two. This statement did not receive full participation from the population. Only eighteen respondents addressed this statement.

Through this survey, the population was twenty-six respondents. Only two statements had less than the population response and those were noted as they were discussed in this section.

Survey: Officers Questionnaire

The officer's survey (Appendix C) was directed at those individuals that have passed an examination and had experience in the classifications they were testing for. This survey was distributed to the eight officers and one emergency medical service coordinator. Of these nine individuals targeted, seven responded. The population for this survey was seven. The results of this survey are listed in table 2 (see page 37).

Since this population participated in the first survey, this survey attempted to define how clearly the test reflected the job and duties the respondents were required to perform when promoted. This survey was used in an attempt to measure the effects training and education had on them, when they passed the examination.

The officer's questionnaire began with demographic information. The first question asked the number of promotional written examinations they had taken. The range of response was two to eight. The second questions asked what year they passed their first promotional exam. Of the seven respondents, six answered prior to 1990. The third question referenced their level of formal education. Five of the respondents have had two years of college, one had three years and one had four years. The last question asked if they had taken an examination since 1989. Two respondents answered no, while the remaining five answered yes.

Table 2 : Officer Questionnaire Response to PART II**The Test**

	strongly disagree () = number of responses					strongly agree				
The test directly related to the duties I was assigned when promoted	1	2	3	4	5					
	(0)	(3)	(3)	(1)	(0)					
Mean = 2.714	Mode = 2					SD = 0.756				
The questions were clear and concise	1	2	3	4	5					
	(2)	(2)	(2)	(1)	(0)					
Mean = 2.286	Mode = 1					SD = 1.113				
The reference material was up to date and current	1	2	3	4	5					
	(1)	(0)	(3)	(2)	(1)					
Mean = 3.286	Mode = 3					SD = 1.254				
I could find each question asked on test in the reference material, after the test	1	2	3	4	5					
	(4)	(1)	(2)	(0)	(0)					
Mean = 1.714	Mode = 1					SD = 0.951				
I found the questions confusing and ambiguous	1	2	3	4	5					
	(0)	(1)	(1)	(3)	(2)					
Mean = 3.857	Mode = 4					SD = 1.069				
The test came primarily from the five main books listed as primary reference	1	2	3	4	5					
	(1)	(1)	(4)	(1)	(0)					
Mean = 2.714	Mode = 3					SD = 0.951				
The reference material, used in testing, directly pertained to the job I was promoted to	1	2	3	4	5					
	(1)	(3)	(1)	(2)	(0)					
Mean = 2.571	Mode = 2					SD = 1.134				
The test was heavily weighted on information that does not relate to my duties today	1	2	3	4	5					
	(0)	(1)	(1)	(4)	(1)					
Mean = 3.714	Mode = 4					SD = 0.951				
The reference material was difficult to read and understand	1	2	3	4	5					
	(2)	(2)	(3)	(0)	(0)					
Mean = 2.143	Mode = 3					SD = 0.900				

Training and Education

My experience in my current position helped me on the test	1	2	3	4	5					
	(2)	(4)	(1)	(0)	(0)					
Mean = 1.857	Mode = 2					SD = 0.690				
Formal officer training increased my knowledge and helped my score	1	2	3	4	5					
	(1)	(5)	(1)	(0)	(0)					
Mean = 2.000	Mode = 2					SD = 0.577				

SD = Standard Deviation

Table 2 : Officer Questionnaire Response to PART II (continued)**Training and Education**

	strongly disagree () = number of responses					strongly agree				
	1	2	3	4	5					
My college education was of great help in taking the test	(1)	(5)	(1)	(0)	(0)					
	Mean = 2.000					Mode = 2				
						SD = .0577				
Tests are different each time so prior test questions were of no help to me	(1)	(2)	(2)	(2)	(0)					
	Mean = 2.714					Mode = 2				
						SD = 1.113				
The help I received from other officers had no effect on my score	(1)	(0)	(1)	(3)	(2)					
	Mean = 3.714					Mode = 4				
						SD = 1.380				
Knowledge of the job description and duties help guide my studies	(1)	(6)	(0)	(0)	(0)					
	Mean = 1.857					Mode = 2				
						SD = 0.378				
My prior exposure to the duties of a lieutenant had no effect on my test score	(0)	(0)	(2)	(5)	(0)					
	Mean = 3.714					Mode = 4				
						SD = 0.488				
Mentoring played an important role in my career advancement	(2)	(2)	(3)	(0)	(0)					
	Mean = 2.143					Mode = 3				
						SD = 0.900				

SD = Standard Deviation

n=7

The next phase asked the candidates to respond to a series of statements. They were asked to weight their response. The responses ranged from a one to five scale. A response of one equaled strongly disagrees with the question asked, while five equaled strongly agree with the question. The results for each statement is listed in table 2 (see pages 38-39).

A series of statements were made about the written examination. When responding to some of the same statements made in the first questionnaire their responses were similar. They disagreed that the test questions were clear and concise. They also agreed the test questions were confusing and ambiguous.

When asked to respond to statements made about the relationship of the written exam to the job they perform as an officer, they disagreed with a direct relationship. The respondents were asked to respond to two statements. The first was that the test directly related to the duties they are assigned to today. They disagreed with that statement. The second statement was the test heavily focused on information that does not relate to the job they were promoted to perform. To this statement, they agreed.

The last group of statements that related to the test was focused on the reference list. The officers agreed that the reference list was up to date and current. They disagreed with the statement that the reference material was difficult to read and understand. They also disagreed when stated that the reference material directly pertained to the job they perform, once promoted.

When asked to respond to the test came primarily from the five main reference books, they slightly disagreed. The mode was three, with two responses disagreeing and one agreeing with the statement.

The officers that responded to this survey strongly disagreed that they could find test questions asked in the written examination, in the reference material, after the test. The mode to this statement was one.

The second category of this survey was training and education. Experiential learning, or on the job experience statements were addressed similarly. The respondents disagreed that their experiences help them in the testing process. They agreed with the statement that prior exposure to the duties of a lieutenant had no effect on their test score.

When responding to a statement that having prior knowledge of the job description and duties of the classification they were promoted to guided their studies, they disagreed, with seven responses.

The officers were more neutral in their response to the statement that test questions are different each time, so prior test questions were of no help. There were three disagreeing and two agree responses.

When asked to respond to formal training or college, the respondents found no benefit in testing. The statement formal officer training increased my knowledge and helped my score, they disagreed with this statement. When asked whether a college education was of great help, they disagreed.

When asked to respond to mentoring or help from others when taking the written test, the responses were negative. They were in disagreement with the statement that mentoring played an important role in my career advancement. They also agreed that help received from others had no effect on their score.

When the officer questionnaire is separated based on the answer given on the fourth demographic question the results are profoundly different. Both of these respondents had passed their first promotional exam prior to 1985. They also had taken only two written exams and had a completed 12 years of school.

Their responses to the statements were mostly opposite to the other five respondents. When asked to relate the beliefs about the test they responded in support or neutral to the test. Neither of the respondents disagreed with the test relating to the duties assigned once promoted and did not agree that the test was heavy on information that does not relate to their duties assigned. This was also true when asked

if the questions were clear and concise, and they did not find the questions confusing or ambiguous.

When responding to statements about the reference materials used, their responses were in support to the reference list. The agreed that the reference list pertained to the job they performed when promoted. They also believed that the test came from the primary reference list. The statements pertaining to the test they agreed with the others was the difficulty in reading and understanding the reference materials.

When responding to statements referencing their training and education, they responded similar to the other respondents except on two statements. Both respondents were the only respondents to agree with the statement that tests are different each time so prior test questions were of no help. They also disagreed, or responded neutral to the statement referring to receiving help from other officer had no effect on their scores on the test. The five other respondents agreed with this statement.

Reference Material Research

The results of the two surveys indicted that reference materials listed on the Michigan Municipal League's (1999), Fire Service Officer Examination Study Guide (Appendix A), were not available. Two Michigan based fire service literature retailers were contacted, as was Barns and Noble, Borders Books, and the International Fire Service Training Association.

Each retailer was asked the availability of each of the specifically listed books on the reference list. The results received from each retailer were identical. Each of the

five retailers polled stated that some of the reference list is not available to be purchased.

The primary reference list had a total of five books listed. The *Fire Protection Handbook* and *The Essentials of Firefighting* had two editions listed. Both of these books were available for purchase, but only in their latest editions. *The Fire Chief's Handbook* and the *Fire Department Company Officer* are not available in the edition listed. Both of these books have new editions in publications and have since 1995 and 1997 respectively. The final book, *Fire Service First Responder* was not available in the original publications date listed, 1987. The availability of this book stopped in 1994, but a book with the same name and publisher was released, in 2000.

The books used researched in the secondary reference list were only those books specifically named. All the books listed were still available, except *Managing in the Fire Service*, which has been replaced by a third edition in 1998, and *Chief Officer* which is has not been available since 1996.

DISCUSSION

It appears that the controlling factors that govern the promotional process, with in the Birmingham Fire Department, are common throughout America's fire service. Walter S. Booth (1999), in his survey of fire department, found that the use of a written exam is the most commonly used form of promotional testing.

The factors that control the promotional process within the Birmingham Fire Department are a legally expected process. Both the City of Birmingham and the Firefighter's Union have established the promotional process in their collective bargaining agreement. In addition to the collective bargaining agreement, the Michigan

Department of Labor Employment Relations Commission has affirmed that the scoring of the written exam will be judged on standard scoring system, with a passing score of seventy percent. William S. Johnson (1995) wrote, when describing his promotional model, that the promotional system should be negotiated and that a passing score of seventy percent, on the written exam, is common.

With a similar promotional process being successfully used throughout America's fire service, the process does not appear to be a major contributing factor in the failure rate of the Birmingham Fire Department's candidates. If this process had the same failure rate among the other fire departments that use it, there would be a much greater amount of literature evaluating this process.

The questionnaires, designed for this project, support this position. The respondent's predominately show no signs of significant test anxiety. In contradiction to the literature, there did not appear to be an advantage to recent graduates that were familiar to the use of scantron forms or testing in general.

The next logical step was to research the test. The recognized three steps in developing a written test are; job analysis, test development, and test administration (Solamon, 1997). The first step, job analysis, is what the written test must be based on (Uniform Guidelines on Employee Selection Procedures, 1978).

The EEOC defines a job analysis as, "A detailed statement of work behaviors and other information relevant to the job" (Uniform Guidelines on Employee Selection Procedures, 1978). Work behaviors involve observed components and unobserved components. "It cannot be overemphasized the importance of doing a job analysis prior

to testing. The job analysis provides the foundation for the validation process” (Reed, 1995, p. 25).

The researcher found the term job analysis was used synonymously with the term job description, in much of the fire service based literature reviewed for this project. The EEOC defines a job description as a general job description (Uniform Guidelines on Employee Selection Procedures, 1978). The EEOC clearly specifies the difference between these two terms, but much of the literature does refer to the definition of a job analysis in using the term job description. This was profoundly illustrated by William S. Johnson (1995) when he wrote, “Once the need arises for a promotional examination, a copy of the job description is sent to the examiner and a bibliography is promulgated” (Fire Chiefs, p. 252). Throughout his chapter, Johnson refers to a job description as a measure of the work behaviors and activities performed. He clearly intended to use the definition given to a job analysis by the EEOC, when using the term job description.

William S. Johnson misuse of these terms was not the only author the researcher found. Many of the authors of the fire service based literature use the term job description in the same manner. The difference was that Johnson clearly defined the meaning of the reference of the term, while many of the other authors did not. The other authors intent was not clear. Many authors referenced the EEOC standard and how it applied to validation in test development when referencing a job description, but they never mentioned the term job analysis.

This was also true when interviewing Fire Chief David Edginton of the Birmingham Fire Department. He believed that job analysis and job descriptions are synonymous terms. He refined his beliefs when asked what validation documentation

was available to support the current promotional process? The Fire Chief produced the Birmingham Fire Departments job descriptions for the positions of Lieutenant and Captain. After reviewing both documents, there were clearly general states of duties and responsibilities and not a measure of work behaviors and activities performed. When asked if they had developed a job analysis, he reiterated and referenced the job description stating, ... “they are the same thing and that’s all the validation we need.” (D. Edginton, personal communication March 8, 2001). He referenced that he has studied this subject, through fire service literature, over the years and once the project's research was completed his position would be supported.

The Birmingham Fire Department could not produce a document that met the intent of the EEOC. The EEOC defines work behavior as, “An activity performed to achieve the objectives of the job” (Uniform Guidelines on Employee Selection Procedures, 1978, 1607-16). The EEOC explains work behaviors as “involved observable (physical) components and unobservable (mental) components. A work behavior consists of the performance of one or more tasks. Knowledge, skills, and abilities are not behaviors, although they may be applied in work behaviors” (Uniform Guidelines on Employee Selection Procedures, 1978, 1607-16).

The questionnaires distributed to the Birmingham Fire Department employees support that a job analysis was not used in developing the test. The respondents believed that the tests had little relationship to the real duties they would have to perform when promoted.

The general respondent’s position was supported through the department’s officers. The respondents to the officer’s questionnaire disagreed that the test directly

related to the duties they were assigned when promoted. They also agreed that the test was heavily weighted on information that does not relate to the position they were promoted too.

The style of test development used in developing the written examination used by the Birmingham Fire Department is common to this type of examination. "A test is a means by which the absence, presence, amount, or nature of some learner quality or ability is observed or inferred and appraised or measured" (Bizjak, 1999, p. 189).

The use of multiple choice based achievement testing is a common form used in measuring these types of results. "The purpose of the achievement test is to determine whether a candidate's knowledge is sufficient to perform the job for which he or she is applying" (Norris, 1990, p.39).

The questionnaires distributed to the employees of the Birmingham Fire Department indicated that the test questions were ambiguous. The concerning issue is the design and construction of the multiple choice test. "Multiple choice tests are not easy to construct. They must be unambiguous and test to the learning level desired" (Bizak, 1999, p. 203). There is a tendency to be ambiguous when designing questions, so not to make the answer obvious (Bizak, 1999).

Donald Summerfield, of the Michigan Municipal League, represents the organization that developed the written examination used by the Birmingham Fire Department. While being interviewed for this project, he explained that an intern wrote the original base questions in 1980. The questions were derived from the reference material list. In designing each question, they attempted not to select questions that would have obvious answers (personal communication, March 8, 2001).

Since that date, questions are modified, edited or removed whenever the *Fire Service Examination Study Guide*, primary reference materials are updated (Appendix A). No new questions have been added to the bank of questions, since 1980. The bank was modified as needed (Donald Summerfield, personal communication, March 8, 2001).

The modification or editing of questions, which have been based on previous reference material, promotes either questions that have a basis in acquainted methods or knowledge or ambiguous questions that have no real answer. Based on the questionnaire responses, both may be evident.

The questionnaire respondents believed that the test questions were ambiguous, but they also indicated that the test did not relate to the duties. The contradictions between the two respondents that had passed their first promotional examination prior to 1985 and the remaining five respondents support this belief. These two respondents' beliefs were just the opposite of the others polled. They found the written exam pertinent and properly worded. Since both respondents only participated in two tests, it appears their exposure to the examination process was during the 1980's. The test bank and reference list was current to the philosophy of the day. The role of a fire officer has changed dramatically since 1980, but the bank of questions fundamentally have not changed and this is reflected in the type of subject matter concentration used in the written examinations.

The literature review indicated that a candidate's ability to compete for promotion has a direct correlation with the level of formal education they have achieved. "Candidates who meet the minimum educational levels are minimally eligible to test,

although more competitive candidates often hold more advanced degrees” (Booth, 1999, p. 80). The respondents of the questionnaires did not support this belief.

The questionnaire responses indicated that participation in a formal education process, whether college or out side training, was of no help in passing the written exam. Formal educational institutions, to maintain an audience, must be current to the needs of the fire service. If a student is taught what to expect today and tomorrow, its understandable why they could not relate this education to the way things used to be done. This would also explain the contradiction between the literature review and the questionnaire responses.

The *Fire Service Officer Examination Study Guide*, which includes the reference material list, was researched for this project (Appendix A). The research discovered that much of the literature listed as reference material was not available for purchase. Some material has not been available for over five years. This supports the questionable relevance of the test to today’s fire service standards for fire officers. “To directly tie a test to the future job duties and responsibilities is known as validity” (Solamon, 1997, p. 82). The direct correlation of the examination, with the duties to be performed was reaffirmed in the court case *Firefighters Institute for Racial Equality v. City of St. Louis*. The court stated that the use of a “paper and pencil examination that essentially tested for written communication skills were held invalid,” when the job required assessing the scene of a fire and issuing orders (Callahan, 1987, p. 55).

“The closer the test resembles the content of required knowledge and skills of the job, the more justified is the claim of content validity” (Wollack, 1976, p.404). Based on the information gained through Birmingham Fire Department documents and the

respondents to the questionnaires, a case could be made that the current written examination is not a valid test.

The respondents on the questionnaire believed that receiving help from others had a major effect on passing the test. The mode for this statement was five, or strongly agree. A total of 18 respondent, out of 26, agreed with this statement, while only four respondents disagreed. This statement, by itself, does not have a strong effect on the research. This statement was designed to measure, if any, the existence of mentoring, in an organization that has no recognized mentoring program. It showed that mentoring exists, but not in a classic format.

Classic mentoring is organization supported and administrated in an attempt to prepares candidates for promotion by exposing and guiding them through the duties and educating them to the knowledge necessary to be successful. In the questionnaires, the respondents believed that knowledge and experience of the role of an officer has no positive effect on their score. They also believe that training and formal education has not had a positive effect in assisting them. The respondent did indicate that help from others did have a positive effect on their score, but not in a classic mentoring format.

Combining all the information gathered in this project, it can be stated that there is mentoring being performed in the Birmingham Fire Department. The mentoring is in the form of needed knowledge to pass the exam. This could be compared to that teacher that no one liked because the class they taught had no relevance to them, but was necessary to graduate. Students whom had taken the class would pass on the test answers that are needed to pass the exams and pass the class. Officers, or others that

have proven success in the promotional process, are passing on information to those they deem worthy. This information is needed to successfully pass a test that is not relevant or current.

The final process in administering a valid test is the actual administration of the test to the candidate. The time allotted for administration of the written exam is three hours, or 180 minutes. This is a constant administration period established by the Michigan Municipal League because they are limited to asking no more than 180 questions on their examinations (Donald Summerfield, March 8, 2001). The accepted standard for administering a written examination, based on multiple choice format, is one question a minute (Bizjak, 1999).

The site used to administer the examination appears to have no dramatic affect on the candidates. The respondents were neutral to this response. Test anxiety can be contributed to distractions while being administrated an exam (Roig, 1991). The mode response was three, or neutral, with equal numbers agreeing or disagreeing with the statement on the questionnaire.

To address the organizational changes needed to enact necessary change in the Birmingham Fire Department requires education of the controlling member of the organization. The collective bargaining agreement that describes the testing process, does not place any specifics on the test, or the testing agency. To change the test or testing agency is considered the right of management (City of Birmingham, 1998).

To enact a change in the testing process requires a directive from the Fire Chief, as long as the change is not in direct conflict with the collective bargaining agreement. To allow a change, without a challenge similar to the action that ended in the State of

Michigan Department of Labor decision on scoring of the test, requires educating the Union officials and their support.

RECOMMENDATIONS

This project was designed to determine what changes are required in the Birmingham Fire Departments promotional process to reduce the high failure rate on their written examinations. It was assumed that a change was needed.

Change is needed to get the desired results of this project. The first change recommended is for the Birmingham Fire Department to immediately perform a job analysis for every position within their organization and to have each job analysis reviewed and updated prior to developing any test. The job analysis must meet the EEOC guidelines.

With the job analysis completed, the next step is to meet with a commercial vendor in designing the promotional examination, and the reference material used to develop the test questions. Much of the existing fire service literature has either a west coast or east coast slant to the methods used to achieve the same goals. The methods use by the Birmingham Fire Department must be incorporated, either by including internal documents in combination with selected fire service literature or verifying the fire service literature selected, corresponds to the methodology used by Birmingham.

In following the change model, discussed in the National Fire Academy program Strategic Management of Change, it is recommended that the fire department administration meet with the union and allow input and discussion of the job analysis. Planning and designing support, through the sharing of information and open communication, is an intricate part of administering a successful change.

The next step would be to have each promotional examination professional, designed to meet the job analysis. It is recommended that the commercial vendor provide documentation that the test meets EEOC guidelines, for validity, and that the test directly addresses the provided job analysis. This can be done by having the vendor reference each test question with the task it represents from the job analysis.

The additional recommendation is to design a formal mentor program. The informal mentoring, currently operating within the organization may have been selecting the organizations past officer based on other standards than those of the organization. The organization must educate all employees in the need for change and how the change is going to occur. Remember that change is never easy, even though the majority of the employees agree it's needed. One clear voice is needed in change and that voice must be that of the administration.

The final recommendation is for both the union and administration to understand that just because a process has been established in a collective bargaining agreement, that it must be reviewed for validity. The promotional process, within the Birmingham Fire Department, is not unusual in design, but when administered improperly caused the problem.

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APPENDIX A

Michigan Municipal League

Fire Service Officer Examination Study Guide

FIRE SERVICE OFFICER EXAMINATION STUDY GUIDE

This is a list of reference materials that would be beneficial for all candidates for fire department promotions to review in preparing for a written examination.

Reference materials are classified “primary” or “secondary.” The primary reference contains material common to most fire departments positions. The secondary references cover more specialized subjects that apply to some positions more than others, or are sources of fewer test questions.

Typically, a test includes more questions from primary references than from secondary ones. The number of test questions from each classification varies, however, depending on the responsibilities of the position, and the designation should not be construed to mean that those materials listed as secondary references are of less **importance** than those designated primary references.

Since this list covers tests for all officer ranks, it may not apply exactly to any single test. Each test is assembled for specific job in requesting jurisdiction. This, for a higher rank in a particular department, **Managing Fire Services**, may be a primary source while **Essentials of Firefighting** may be a minor source.

Reliance on specific sources will vary depending on the duties and requirements of the job (rank) for which the test is prepared. For example, candidates for either sergeant or chief may expect questions from the **Fire Protection Handbook**. However, the questions on the sergeant exam may be from subject areas such as “Advanced Fire Fighting”, “Pumps”, and “Respiratory Protection”, with none on “Administration”, “Evaluation and Planning”, etc. In an exam for chief, the reverse may be true.

When the same subject areas are covered at all test levels, the level of difficulty of the questions will vary with the rank. For example, while all officers may be tested on their “problem solving” abilities, problem presented at the lower ranks generally will be less complex and involved more basic language than those for higher ranks.

This is not an all-inclusive resource list; related fire publications and subject matter experts are also used in the development of examinations. Descriptions of the most common knowledge areas tested are included.

If any of the listed materials were not available, other similar resources that cover the same subject areas would be appropriate for study.

Subject Areas for Fire Service Officer Examinations

General Technical Knowledge

This area includes knowledge of: behavior of fire and principles of fire spread; internal fire protection system; common causes of firefighter injuries; and advanced first aid.

Knowledge of Fire Suppression, Inspection and Planning

Includes knowledge of: leading causes of fire, use of fire suppression equipment and apparatus; interpreting charts, floor plans, blueprints, prefire planning; agencies and organizations providing support services to fire departments; laws and regulations relating to safety and health practices.

Knowledge of Size-up, Fire Ground and Hazards

Includes knowledge of: style of supervision appropriate to different situations; personnel assignment at a fireground; individual differences in supervision, training and evaluating subordinates; decision-making under stress; and responsibilities of other fire department positions.

Knowledge of Personnel Procedures, Management and Administration

Includes knowledge of: work motivation principles; performance evaluation and work-related counseling; procedures to resolve disputes and complaints; training methods and procedures; personnel policies; grievance procedures; and recordkeeping reporting procedures.

● * * * * *

Resource material covering all fire department promotional line positions. Subjects areas covered in a specific examination will depend on the responsibility level of the position.

MICHIGAN MUNICIPAL LEAGUE Fire Service Officer Examination Study Guide

PRIMARY REFERENCES

Fire Protection Handbook, National Fire Protection Association, 17th Edition (1991), or 18th Edition (1997)

The Fire Chief's Handbook, Casey, 4th edition (1978)

The Essentials of Firefighting, International Fire Service Training Association, 3rd Edition (1993), or 4th Edition (1998)

Fire Department Company Officer, International Fire Service Training Association, 2nd Edition (1989)

Fire Service First Responder, International Fire Service Training Association, 1st Edition (1987)

SECONDARY REFERENCES

Managing Fire Services, International City Management Association, 2nd Edition (1988)

Managing in the Fire Service, National Fire Protection Association, 2nd Edition (1989)

Fire Inspection and Code Enforcement, International Fire Service Training Association, 6th Edition (1998)

Effective Supervisory Practices, International City Management Association, 3rd Edition (1995)

Chief Officer, International Fire Service Training Association, 1st Edition (1985)

Other publications of the International Fire Service Training Association such as Fire Service Rescue, 6th Edition (1996); Hose Practices, 7th Edition (1988); and Fire Service Ventilation, 7th Edition (1994).

For example, most of the content of The Essentials of Firefighting is covered in more depth and detail in other books the same publisher. Most of the same information available in Fire Service First Responder can also be found in first aid, CPR, and other related publications of the American Red Cross. Also, subjects covered by the ISFTI "Training Keys" are usually similar to IFSTA training manuals.

APPENDIX B

Questionnaire

Questionnaire

PART I

1. How many years of seniority do you have?
2. How many promotional exams have you taken?
3. If you passed an exam, what year(s) did you pass and on which attempt?
4. How many exams have you taken since 1990 and what was the result (pass/fail)?
4. How many years of school have you completed: 12 13 14 15 16 17 18

Think in terms of what effects each statement had on you when taking the promotional exam. Using a scale of "1 to 5" where "1" means STRONGLY DISAGREE and "5" means STRONGLY AGREE, please indicate your beliefs by circling the appropriate number for each statement as to the effect it had on you in the promotional process. You may choose any number on the scale to express your opinion.

PART II

		strongly disagree			strongly agree
a.	I do not like tests.	1	2	3	4 5
b.	The questions were clear and concise	1	2	3	4 5
c.	I performed better on multiple-choice questions.	1	2	3	4 5
d.	The questions were confusing and ambiguous	1	2	3	4 5
e.	I performed better on true and false questions	1	2	3	4 5
f.	The score sheet was easy to follow and use.	1	2	3	4 5
g.	I found the multiple choice question hard.	1	2	3	4 5
h.	The test came primarily from the five main books listed as primary reference	1	2	3	4 5
i.	The reference material directly pertained to the job I was testing for	1	2	3	4 5
j.	The reference material was easy to find	1	2	3	4 5
k.	The test was evenly balanced from all reference materials	1	2	3	4 5
l.	The reference material was quickly understood and retained	1	2	3	4 5
m.	My experience in my current position helped me on the test	1	2	3	4 5
n.	Prior in-service training helped me	1	2	3	4 5
o.	Prior out-side officer training did nothing to help me	1	2	3	4 5
p.	My college education was of no aid in taking the test	1	2	3	4 5
q.	Having taken the exam and seeing the questions before was very helpful	1	2	3	4 5
r.	Receiving help and study material from others raised my score	1	2	3	4 5
s.	Knowledge of the job description and duties had no effect on my score	1	2	3	4 5
t.	Distraction while taking the test had an effect on my score	1	2	3	4 5
u.	I made numerous errors on the score sheet	1	2	3	4 5
v.	The test had little relationship to the real duties of the job I was testing for.	1	2	3	4 5
w.	The reference material was out dated	1	2	3	4 5
x.	I could relate most of the test questions back to the reference materials	1	2	3	4 5
y.	I found the true and false question difficult	1	2	3	4 5

That concludes the survey, thank you very much for your time. Please place this questionnaire in Capt. Deadman's incoming tray.

APPENDIX C
Officer Questionnaire

Officers Questionnaire

PART I

1. How many promotional exams have you taken?
2. What year did you pass your first promotional exam?
3. How many years of school had you completed when first promoted: 12 13 14 15 16 17 18
4. Have you taken a promotional exam since 1989?

Think in terms of what effects each statement had on you when taking the promotional exam. Using a scale of "1 to 5" where "1" means **STRONGLY DISAGREE** and "5" means **STRONGLY AGREE**, please indicate your beliefs by circling the appropriate number for each statement as to the effect it had on you in the promotional process. You may choose any number on the scale to express your opinion.

PART II

		strongly disagree			strongly agree		
a.	The test directly related to the duties I was assigned when promoted.	1	2	3	4	5	
b.	The questions were clear and concise	1	2	3	4	5	
c.	My prior exposure to the duties of a lieutenant had no effect on my test score	1	2	3	4	5	
d.	I found the questions confusing and ambiguous	1	2	3	4	5	
e.	The test came primarily from the five main books listed as primary reference	1	2	3	4	5	
f.	The reference material, used in testing, directly pertained to the job I was promoted to. .	1	2	3	4	5	
g.	The test was heavily weighted on information that does not relate to my duties today . .	1	2	3	4	5	
h.	The reference material was difficult to read and understand.	1	2	3	4	5	
i.	My experience in my current position helped me on the test	1	2	3	4	5	
j.	Formal officer training increased my knowledge and helped my score	1	2	3	4	5	
k.	My college education was of great help in taking the test	1	2	3	4	5	
l.	Tests are different each time so prior test questions were of no help to me	1	2	3	4	5	
m.	The help I received from other officers had no effect on my score	1	2	3	4	5	
n.	Knowledge of the job description and duties help guide my studies	1	2	3	4	5	
o.	The reference material was up to date and current	1	2	3	4	5	
p.	I could find each question asked on test in the reference material, after the test	1	2	3	4	5	
q.	Mentoring played an important role in my career advancement	1	2	3	4	5	

That concludes the survey, thank you very much for your time. Please place this questionnaire in Capt. Deadman's incoming tray.